

## Characterization of Two Hybrid Welding Techniques on SA 516 Grade 70 Weldments

**Authors :** M. T. Z. Butt, T. Ahmad, N. A. Siddiqui

**Abstract :** Commercially SA 516 Grade 70 is frequently used for the manufacturing of pressure vessels, boilers and storage tanks etc. in fabrication industry. Heat input is the major parameter during welding that may bring significant changes in the microstructure as well as the mechanical properties. Different welding technique has different heat input rate per unit surface area. Materials with large thickness are dealt with different combination of welding techniques to achieve required mechanical properties. In the present research two schemes: Scheme 1: SMAW (Shielded Metal Arc Welding) & GTAW (Gas Tungsten Arc Welding) and Scheme 2: SMAW & SAW (Submerged Arc Welding) of hybrid welding techniques have been studied. The purpose of these schemes was to study hybrid welding effect on the microstructure and mechanical properties of the weldment, heat affected zone and base metal area. It is significant to note that the thickness of base plate was 12 mm, also welding conditions and parameters were set according to ASME Section IX. It was observed that two different hybrid welding techniques performed on two different plates demonstrated that the mechanical properties of both schemes are more or less similar. It means that the heat input, welding techniques and varying welding operating conditions & temperatures did not make any detrimental effect on the mechanical properties. Hence, the hybrid welding techniques mentioned in the present study are favorable to implicate for the industry using the plate thickness around 12 mm thick.

**Keywords :** grade 70, GTAW, hybrid welding, SAW, SMAW

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